

WHAT IS CLAIMED IS:

- 1 1. A process for bleaching pulp with ozone, which comprises the steps of:
2 preparing a slurry of cellulosic pulp having a fiber consistency of from 1
3 to less than 5 weight %;
4 adding ozone to the cellulosic pulp in a contacting device to create a partial
5 pressure [P_p] of O₃ greater than 1.4 psi and reacting the ozone with the pulp in
6 said contacting device under high shear mixing conditions; and
7 maintaining the ozone in contact with the pulp for a time sufficient to
8 bleach the pulp.

- 1 2. The process of claim 1, wherein the partial pressure of ozone applied
2 to the contacting device is sufficient to give at least 0.2 units lower Kappa number
3 as compared to 1.4 psi partial pressure ozone conditions using the same ozone
4 dosage.

- 1 3. The process of claim 1 for bleaching pulp with ozone wherein the
2 bleached fibers are passed onto a chlorine dioxide bleaching stage.

- 1 4. The process of claim 1 for bleaching pulp, wherein the cellulosic pulp
2 used to prepare the slurry is obtained from a chlorine dioxide bleaching stage.

- 1 5. The process of claim 1, wherein the contacting device is a high shear
2 mixer which produces high shear by high rotational speeds across a narrow gap
3 through which the pulp slurry flows.

1 6. The process of claim 1 for bleaching pulp, wherein the ozone/cellulosic
2 pulp is passed into a pressurized retention tube where the ozone reacts with the
3 lignin in the cellulosic pulp.

1 7. The process of claim 6 for bleaching pulp, wherein the ozone/cellulosic
2 pulp from the retention tube leaves the retention tube through a pressure control
3 valve and is discharged into a separate vessel, where the gas is separated and then
4 passed into an ozone destruct unit before venting to the atmosphere, and the pulp
5 slurry is pumped to a subsequent bleaching stage.

1 8. The process of claim 1 for bleaching pulp, wherein the ozone used in
2 the process is generated on-site from oxygen in a pressurized ozone generator.

1 9. The process of claim 8, in which the ozone generator produces ozone
2 from oxygen at a concentration of from 4 to 20%.

1 10. The process of claim 8, in which the ozone generator produces ozone
2 from oxygen at a concentration of from 10 to 14%.

1 11. The process of claim 8, wherein the source of oxygen used for ozone
2 generation is an on site air separation process.

1 12. The process of claim 11, wherein the air separation process is a
2 vacuum swing absorption process.

1 13. The process of claim 8 for bleaching pulp with ozone, wherein the
2 ozone gas mixture generated is compressed to a total pressure of from 20-200 psi.

1 14. The process of claim 8, wherein the ozone gas mixture generated is
2 compressed to a total pressure of from 80 to 150 psi.

1 15. The process of claim 1, wherein the partial pressure of ozone created
2 in the contacting device ranges from greater than 1.4 psi up to 43 psi.

1 16. The process of claim 1, wherein the partial pressure of ozone created
2 in the contacting device ranges from 9.5 psi to 23 psi.

1 17. The process of claim 1 for bleaching pulp, wherein the pulp slurry
2 consistency is in the range of from 2 to 4 weight %.

1 18. The process of claim 1 for bleaching pulp, wherein the ozone is
2 mixed with the cellulosic fibers in the contacting device for a period of time
3 ranging from 0.01 second to 1 minute.

1 19. The process of claim 1, wherein the ozone is mixed with the
2 cellulosic fibers in the contacting device for a period of time ranging from 0.04
3 second to 1 second.

1 20. The process of claim 4 for bleaching pulp, wherein the residence time
2 in the retention tube ranges from 1 to 10 minutes.

1 21. The process of claim 1 for bleaching pulp, wherein temperature of the
2 pulp slurry entering the mixing with ozone is in the range of from 20 to 80°C.

1 22. The process of claim 7 for bleaching pulp, wherein the subsequent
2 bleaching stage involves chlorine dioxide as the bleaching agent.

1 23. The process of claim 5, wherein a gas meter is present in a conduit to
2 the high shear mixer in order to regulate the flow of gas mixture to the mixer.

1 24. The process of claim 5, wherein the high shear mixer is connected to
2 an ozone compressor such that the ozone delivered to the high shear mixer
3 contacting device has been first compressed.